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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/675,811	09/29/2000	Ron Carmel	VTI011A	1164

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EXAMINER

FERRIS III, FRED O

ART UNIT	PAPER NUMBER
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2128

DATE MAILED: 06/18/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/675,811

Applicant(s)

CARMEL ET AL.

Examiner

Fred Ferris

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 September 2000.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 and 2 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1 and 2 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 September 2000 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 6.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

1. *Claims 1-2 have been presented for examination based on applicant's disclosure filed on 29 September 2002. Claims 1-2 have been rejected by the examiner.*

Priority

2. *Applicant's claim for priority benefit to United States Provisional Patent Application Serial No. 60/157,272 filed 01 October 1999 is acknowledged.*

Drawings

3. *The informal drawings submitted on 28 September 2002 are acceptable for examination purposes only. New formal drawings will be required when the case is allowed.*

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. *Claims 1-2 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.*

Specifically, claim 1 is vague and indefinite for the following reasons:

- *The variables are not defined*
- *The subsets are not defined*

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- *The either/or process for combining/selecting LSA subsets is not defined*
 - *No output is defined and no application of the result to simulating an interaction is given*
 - *The result of sending the constructed LSA to the PEE controller is undefined*
- Claim 2 is vague and indefinite since the data structures and procedures used in processing of scene graphs are undefined.*

5. *Claims 1-2 are also rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 2172.01. The omitted steps are:*

- *Claim 1: steps following sending the constructed LSA to the PEE controller*
- *Claim 2: steps for processing scene graphs using data structures and procedures.*

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

6. *Claims 1-2 are rejected under 35 U.S.C. 101 because the claimed invention lacks patentable utility. Specifically, claims 1-2 are drawn to a method for simulating an interaction and processing scene graphs using data structures. The Examiner submits that Applicant's have not recited any limitations relating to a practical application in the technological arts. (see MPEP 2106)*

*An invention which is eligible for patenting under 35 U.S.C. § 101 is in the “useful arts” when it is a machine, manufacture, process or composition of matter, which produces a concrete, tangible, and useful result. The fundamental test for patent eligibility is thus to determine whether the claimed invention produces a “**useful, concrete and tangible result.**” The test for practical application as applied by the examiner involves the determination of the following factors:*

*(1) “Useful” - The Supreme Court in *Diamond v. Diehr* requires that the examiner look at the claimed invention as a whole and compare any asserted utility with the claimed invention to determine whether the asserted utility is accomplished.*

*(2) “Tangible” - Applying *In re Warmerdam*, 33 F.3d 1354, 31 USPQ2d 1754 (Fed. Cir. 1994), the examiner will determine whether there is simply a mathematical construct claimed, such as a disembodied data structure and method of making it. If so, the claim involves no more than a manipulation of an abstract idea and therefore, is nonstatutory under 35 U.S.C. § 101. In *Warmerdam* the abstract idea of a data structure became capable of producing a useful result when it was fixed in a tangible medium which enabled its functionality to be realized.*

(3) “Concrete” - Another consideration is whether the invention produces a “concrete” result. Usually, this question arises when a result cannot be assured. An appropriate rejection under 35 U.S.C. § 101 should be accompanied by a lack of enablement rejection, because the invention cannot operate as intended without undue experimentation.

The Examiner respectfully submits, under current PTO practice, and in view of the 112(2) rejections, that the claimed invention does not recite either a useful, concrete, or tangible result and is merely drawn to a mathematical algorithm. (i.e.

constructing an LSA (claim 1) and processing scene graphs using data structures (claim 2))

- The invention is not useful as a result of the 112(2) rejections which make it difficult to determine Applicant's invention.

- The claims are not concrete because the results are not assured. Is a solution possible for any and all arbitrary inputs? For example, is it possible to construct a set of LSA's for all potential virtual objects (claim 1)? Is it possible to combine all subset LSA's into a single subset (claim 1)?? In claim 1, what is the output (result) and how is it used in simulating an interaction?? How is this claimed "simulated interaction" applied to the technological arts?? In claim 1, what step occurs (or what is the result) after the constructed LSA is sent to the PEE controller?? In claim 2, how are the claimed data structures and procedures used in processing scene graphs and how is this process applied to the technological arts??

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.

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2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

7. Claims 1-2 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,266,053 issued to French et al in view of U.S. Patent 6,215,495 issued to Grantham et al.

While the claims describing the elements of the limitations of the claimed invention are delinquent in the areas cited above under 35 USC 101 and 35 USC 112(2) rejections, the examiner has made prior art rejections based on a good faith attempt at interpreting the language of the claims.

Independent claim 1 is drawn to:

Method for simulating an interaction by:

Checking for collision between VEE (effector) and virtual environment

Constructing LSA for collisions

LSA corresponds object portion in contact with VEE

Store LSA's in buffer

Finding subset of LSA's in buffer for VEE

Combine LSA subset into single or select most significant

Construct selected LSA for each VEE

Send LSA to PEE controller

Regarding independent claims 1-2: French teaches time based mapping
between scene graph nodes. Applicant's specification (pages 5-7) defines a Neutral Scene Graph (NSG) as two synchronized scene graphs (graph A and graph B). The examiner has interpreted the time based scene graph mapping disclosed by French to be functionally equivalent to the NSG process as claimed by applicants. (Abstract, Summary, CL12-L53-63, CL14-L60-CL15-L64, CL18-7-35, CL19-L1-20, Figs. 2, 14)

French does not explicitly teach collision detection between objects in a virtual environment by constructing sets/subsets of local surface approximations (LSA's).

Grantham teaches checking for collision between objects (effectors) and constructing object collisions by groups of classes and subclasses (i.e. set and subsets) (Fig. 12, 13). Grantham further discloses detecting corresponding object contact portions (CL22-L50-65, CL29-L15, Figs. 10), storing and finding constructed collision class/subclasses in a buffer (Abstract, CL4-L17-55, CL22-L50-65, Fig. 1), selecting the most significant feature (CL21-L62-CL22-L49, Fig. 10), and sending the result to a controller (interpreter) (CL19-L60-CL20-L7, CL20-L33-65, Figs. 2, 9, 10, 12). The examiner also notes that the use of local surface approximations (LSA's) is a well-known technique commonly used in three-dimensional processing (see Erikson page, 13, paragraph 2, Figure 4.6, for example), and hence, would have been an obvious design choice in implementing the claimed invention.

It would have been obvious to one having ordinary skill in the art at the time the claimed invention was made, to modify the teachings of French relating to time based mapping of scene graphs, with the teachings of Grantham relating to checking for collision between objects and constructing object collisions by groups/sets to realize the claimed invention. An obvious motivation exists since this area of technology is highly competitive with virtual reality simulators available in the market place and large amounts of money being spent in product development and improvement. (See "Haptic Sculpting of Dynamic Surfaces", F. Dachille, 1999 Symposium on Interactive 3D Graphics, pp. 103-110, ACM April 1999 - conclusion, for example) Accordingly, a skilled artisan would have made an effort to become aware of what capabilities had already been developed in the market place and, hence, would have been motivated to modify

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the teachings of French with the teachings of Grantham in order to reduce development time and cost.

Claim Rejections - 35 USC § 102

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. Claim 2 is rejected under 35 U.S.C. 102(b) as being anticipated by “V-Collide: Accelerated Collision Detection for VRML”, T. Hudson, VRML 97”, pp. 117-124, ACM 0-89791-886-x/97/02, ACM 1997.

Regarding independent claim 2: Hudson teaches processing scene graphs using data structures and procedures where the scene graphs are time synchronized. As noted above, applicant's specification (pages 5-7) has defined a Neutral Scene Graph (NSG) as two synchronized scene graphs. Accordingly, the examiner has interpreted the broad limitations of claim 2 to be functionally equivalent to the V-Collide VRML process taught by Hudson. (Abstract, Introduction, Sections 2.0, 3.1, 3.2, 4.1, Fig. 1, Tab. 1)

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure, careful consideration should be given prior to applicant's response to this Office Action.

U.S. Patent 5,977,977 issued to Kajiya et al teaches scene graphs and collision detection in virtual environments.

U.S. Patent 6,326,964 issued to Snyder et al teaches scene graphs and collision detection in virtual environments.

"Synchronization in Multimedia Data Retrieval", A. Hac, International Journal of Network Management, Vol. 7, 33-62, 1997 teaches scene graph synchronization.

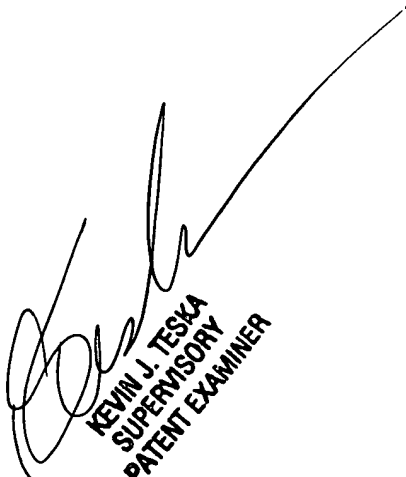
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Fred Ferris whose telephone number is 703-305-9670 and whose normal working hours are 8:30am to 5:00pm Monday to Friday.

Any inquiry of a general nature relating to the status of this application should be directed to the group receptionist whose telephone number is 703-305-3900.

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